Yu-Chuan Lin

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EDUCATION

The Pennsylvania State University — Aug. 2017
PhD in Materials Science and Engineering — University Park, PA

National Taiwan University — Jun. 2011
MS in Physics — Taipei, Taiwan

National Cheng Kung University — Jun. 2009
BS in Physics — Tainan, Taiwan

RESEARCH EXPERIENCE

11/2017 – Current	Postdoctoral Researcher, led by Dr. David Geohegan	Oak Ridge National Laboratory
1/2013 – 11/2017	Graduate Researcher, advised by Prof. Joshua Robinson	Penn State University
7/2011 – 12/2011	Research Assistant, advised by Prof. Lain-Jong Li	Academia Sinica
9/2009 – 6 /2011	Master Thesis, advised by Prof. Lain-Jong Li	Academia Sinica

HONORS AND AWARDS

2018 *Thesis Awards*, Springer Theses	Penn State University
2016 *Silver Medalist,* MRS Graduate Student Award	Penn State University
2007 *Excellent Achievement*, Freshman Calculus Contest Award	National Cheng Kung University

RESEARCH AND INTERESTS

2D materials and van der Waals heterostructures | Thin Film Techniques and Processing | Optical and Electrical Phenomena | Transistors and Nanoelectronics

PUBLICATIONS

Lead author

1. **Y.-C. Lin**,† B. Jariwala,† B. M. Bersch, K. Xu, Y. Nie, B. Wang, S. M. Eichfeld, X. Zhang, T. Choudhury, Y. Pan, R. Addou, C. M. Smyth, J. Li, K. Zhang, A. Haque, S. Fölsch, R. M. Feentra, R. M. Wallace, K. Cho, S. K. Fullerton, J. M. Redwing, and J. A. Robinson, "Large-area, Electronic-grade Two-dimensional Semiconductors", **ACS Nano** (2018), 18, 965-975 († Equal contribution)
2. B. M. Bersch,† S. M. Eichfeld,† **Y.-C. Lin**,† K. Zhang, G. R. Bhimanapati, A. F. Piasecki, M. Labella III, J. A. Robinson, "Selective area growth and controlled substrate coupling of transition metal dichalcogenides" **2D Materials** (2017), 4, 025083 († Equal contribution)
3. **Y.-C. Lin**, K. DeLello, H.-T. Zhang, K. Zhang, J. A. Robinson, "Photoluminescence of monolayer transition metal dichalcogenides integrated with VO_2" **Journal of Physics: Condensed Matter** (2016), 28, 50
4. **Y.-C. Lin**, J. Li, S. C. de la Barrera, S. M. Eichfeld, Y. Nie, R. Addou, P. C. Mende, R. M. Wallace, K. Cho, R. M. Feenstra, J. A. Robinson, "Tuning electronic transport in epitaxial graphene-based van der Waals heterostructures" **Nanoscale (**2016), 8, 8947
5. **Y.-C. Lin**, R. K. Ghosh, R. Addou, N. Lu, S. M. Eichfeld, H. Zhu, M.-Y. Li, X. Peng, M. J. Kim, L.-J. Li, R. M. Wallace, S. Datta, J. A. Robinson, "Atomically thin resonant tunneling diodes built from synthetic van der Waals heterostructures" **Nature Communications** (2015), 6, 7311
6. **Y.-C. Lin**, C.-Y. S. Chang, R. K. Ghosh, J. Li, H. Zhu, R. Addou, B. Diaconescu, T. Ohta, X. Peng, M. J. Kim, J. T. Robinson, R. M. Wallace, T. S. Mayer, S. Datta, L.-J. Li, J. A. Robinson, "Atomically thin heterostructures based on single-layer tungsten diselenide and graphene" **Nano Letters** (2014), 14, 6936-6941
7. **Y.-C. Lin**, N. Lu, N. Perea-Lopez, J. Li, Z. Lin, C. H. Lee, C. Sun, L. Calderin, P. N. Browning, M. S. Bresnehan, M. J. Kim, T. S. Mayer, M. Terrones, J. A. Robinson, "Direct synthesis of van der Waals solids" **ACS Nano** (2014), 8, 3715-3723
8. **Y.-C. Lin**, W. Zhang, J.-K. Huang, K.-K. Liu, Y.-H. Lee, C.-T. Liang, C.-W. Chu, L.-J. Li, "Wafer-scale MoS_2 thin layer prepared by MoO_3 sulfurization" **Nanoscale** (2012), 4, 6637-6641
9. **Y.-C. Lin**, K.-K. Liu, C.-Y. Wu, C.-W. Chu, J. C.-W. Wang, C.-T. Liang, L.-J. Li, "Efficient reduction of graphene oxide catalyzed by copper" **Physical Chemistry Chemical Physics** (2012), 14, 3083-3088

Contributing author

1. R. Addou, C. M. Smyth, J.-Y. Noh, **Y.-C. Lin**, Y. Pan, S. M. Eichfeld, S. Fölsch, J. A. Robinson, K. Cho, R. M. Feenstra, R. M. Wallace, "One dimensional metallic edge in atomically yhin WSe_2 induced by air exposure" **2D Materials** (2018), 5, 025017
2. Y. Pan, S. Fölsch, Y. Nie, D. Waters, **Y.-C. Lin**, B. Jariwala, K. Zhang, K. Cho, J. A. Robinson, R. M. Feenstra,

"Quantum-confined electronic states arising from Moiré pattern of MoS_2-WSe_2 heterolayers" **Nano Letters** (2018), 18, 1849-1855

3. H.-M. Li, B. Bourdon, L. Hao, **Y.-C. Lin**, J. A. Robinson, A. Seabaugh, S. K. Fullerton-Shirey, "Electric double layer dynamics in polyethylene oxide $LiClO_4$ on graphene transistors" **The Journal of Physical Chemistry C** (2017), 121, 12996-17004
4. E. W. Kinder, A. Fuller, **Y.-C. Lin**, J. A. Robinson, S. K. Fullerton-Shirey, "Increasing the electrical double layer retention time of graphene field-effect transistors using polyvinyl alcohol and $LiClO_4$" **ACS Applied Materials and Interfaces** (2017), 9, 25006-25013
5. X.-X. Zhang, Z. Liu, T. Cao, **Y.-C. Lin**, F. Zhang, Y. Wang, Z. Li, J. Hone, J. A. Robinson, S. G. Louie, D. Smirnov, T. F. Heinz, "Magnetic brightening of dark excitons in monolayer WSe_2" **Nature Nanotechnology** (2017), 12, 883-888
6. Z. Y. Al Balushi, K. Wang, R. M. Ghosh, R. A. Vilá, S. M. Eichfeld, J. D. Caldwell, X. Qin, **Y.-C. Lin**, P. A. DeSario, S. Subramanian, D. F. Paul, R. M. Wallace, S. Datta, J. M. Redwing, J. A. Robinson, "Two-dimensional gallium nitride realized by graphene encapsulation" **Nature Materials** (2016), 15, 1166-1171
7. C. E. Giusca, I. Rungger, V. Panchal, C Melios, **Y.-C. Lin**, E. Kahn, A. L. Elias, J. A. Robinson, M. Terrones, "Excitonic effects in tungsten disulphide Monolayers on two-layer graphene" **ACS Nano** (2016), 10, 7840-7846
8. S. C. de la Barrera, **Y.-C. Lin**, S. M. Eichfeld, J. A. Robinson, R. M. Feenstra, "Thickness characterization of atomically-thin WSe_2 on epitaxial graphene by low-energy electron reflectivity oscillations" **Journal of Vacuum Science and Technology B** (2016), 34, 04J106
9. J. Distefano, **Y.-C. Lin**, J. Robinson, N. R. Glavin, A. A. Voevodin, J. Brockman, M. Kuhn, B French, S. W. King, "Band alignment at MoS_2/BN/Al_2O_3 interfaces" **Journal of Electronic Materials** (2016), 45, 983-988
10. S. M. Eichfeld, L. Hossain, **Y.-C. Lin**, A. F. Piasecki, B. Kupp, A. G. Birdwell, R. A. Burke, N. Lu, X. Peng, J. Li, A. Azcatl, S. McDonnell, R. M. Wallace, M. J. Kim, T.S. Mayer, J. M. Redwing, J. A. Robinson, "Highly scalable, atomically thin WSe_2 grown via metal-organic chemical vapor deposition" **ACS Nano** (2015), 9, 2080-2087
11. Z. Y. Al Balushi, T. Miyagi, **Y.-C. Lin**, K. Wang, L. Calderin, G. Bhimanapati, J. M. Redwing, J. A. Robinson, "The impact of graphene properties on GaN/AlN nucleation" **Surface Science** (2015), 634, 81-88
12. S. M. Eichfeld, C.M. Eichfeld, **Y.-C. Lin**, L. Hossain, J. A. Robinson, "Rapid, non-destructive evoluation of ultrathin WSe_2 using spectroscopic ellipsometry" **APL Materials** (2015), 2, 092508
13. P. N. Browning, S. M. Eichfeld, K. Zhang, L. Hossain, **Y.-C. Lin**, K. Wang, N. Lu, A. R. Waite, A. A. Voevodin, M. Kim, J. A. Robinson, "Large-area synthesis of WSe_2 from WO_3 by selenium-oxygen ion exchange" **2D Materials** (2015), 2, 014003
14. K.-K. Liu, W. Zhang, Y.-H. Lee, **Y.-C. Lin**, M.-T. Chang, C.-Y. Su, C.-S. Chang, H. Li, Y. Shi, H. Zhang, C.-S. Lai, L.-J. Li, "Growth of large-area and highly crystalline MoS_2 thin layers on insulating substrates" **Nano Letters** (2012), 12, 1538-1544

CONFERENCE PROCEEDINGS

1. R. K. Ghosh, **Y.-C. Lin**, J. A. Robinson, S. Datta, "Heterojunction resonant tunneling diode at the atomic limit" **IEEE Int. SISPAD** (2015), 266-269
2. J. A. Robinson, S. M. Eichfeld, **Y.-C. Lin**, N. Lu, M. J. Kim, "Growth morphology and defects in 2D heterostructures and interfaces" **Microscopy and Microanalysis** (2015), 21, 101-102
3. B. M. Bersch, **Y.-C. Lin**, K. Zhang, S. M. Eichfeld, J. H. Leach, R. Metzger, K. Evans, J. A. Robinson, "Two-dimensional materials for low power and high frequency devices" **Proc. SPIE** (2015), 9467, 94670T
4. K. Zhang, S. M. Eichfeld, J. H. Leach, B. Metzger, **Y.-C. Lin**, K. Evans, J. A. Robinson, "Synthesis of two dimensional materials for beyond graphene devices" **Proc. SPIE** (2015) 9467, 94670O, 846207
5. K.-K. Liu, Y.-H. Lee, **Y.-C. Lin**, J.-K. Huang, X.-Q. Zhang, T.-W. Lin, L.-J. Li, "Chemical vapor deposited MoS_2 thin layers and their applications" **ECS Transaction** (2013), 50, 61-63
6. K.-Y. Chen, C.-T. Liang, D.-R. Hang, L.-H. Lin, C.-F. Huang, Y.-H. Chang, C.-Y. Huang, J.-C. Chen, C.-C. Tang, S.-F. Chen, **Y.-C. Lin**, C.-H. Liu, K. A. Cheng, "On the coexistence of localization and semiclassical transport in the low-field quantum Hall effect" **Physical E** (2012), 44, 1558-1561

REVIEW AND BOOK CHAPTERS

1. K. Zhang, Y.-C. Lin, J. A. Robinson, "Synthesis, Properties, and Stacking of Two-dimensional Transition Metal Dichalcogenides" **Semiconductors and Semimetals** (2016), 95, 189-219
2. J. A. Robinson, M. S. Bresnehan, M. J. Hollander, **Y.-C. Lin**, "Epitaxial Graphene: Synthesis, Heterogeneous Integration, and Applications" in "Beyond Graphene, New Layered Nanomaterials: Theory, Experiment and Applications" **Wiley-VCH Verlag** (2016)

PRESENTATIONS

1. **Y.-C. Lin**, "Properties of Synthetic Two-Dimensional Materials and Heterostructures" Oak Ridge National Laboratory, **invited talk**, Oak Ridge, TN (2017)
2. **Y.-C. Lin**, "The Quest for Understanding Novel Properties in Beyond-Graphene 2D Layers" Columbia University,

invited talk, New York City, NY (2017)

3. **Y.-C. Lin**, B. Jariwala, B. M. Bersch, S. M. Eichfeld, T. H. Choudhury, B. Wang, R. M. Feentra, R. Addou, J. Li, X. Zhang, R. M. Wallace, J. A. Robinson, "Scalable Epitaxial Tungsten Diselenide Atomic Layers Grown via Metal-Organic Chemical Vapor Deposition" **SRC TECHON**, Austin, TX (2017)
4. **Y.-C. Lin,** R. Addou, Q. Wang, C. Smyth, S. M. Eichfeld. Ganesh R. Bhimanapati, M. J. Kim, R. M. Wallace, J. A. Robinson, "Novel Defect-Mediated Transport in van der Waals Heterostructures" **MRS Fall Meeting**, Boston, MA (2016)
5. **Y.-C. Lin**, S. M. Eichfeld, J. Li, S. C. de la Barrera, R. M. Wallace, R. M. Feenstra, J. A. Robinson, "Tuning Electronic Transport in Epitaxial Graphene-based van der Waals Heterostructures" **Carbon 2016**, University Park, PA (2016)
6. **Y.-C. Lin**, S. M. Eichfeld, J. Li, S. C. de la Barrera, R. M. Wallace, R. M. Feenstra, J. A. Robinson, "Multilayer Stacks of WSe_2 Grown on Epitaxial Graphene and Their Novel Charge Transports" **MRS Spring Meeting**, Phoenix, AZ (2016)
7. **Y.-C. Lin**, R. K. Ghosh, R. Addou, N. Lu, S. M. Eichfeld, H. Zhu, M.-Y. Li, X. Peng, M. J. Kim, R. M. Wallace, L.-J. Li, "Direct Synthesis of Advanced van der Waals Heterostructures based on Graphene, MoS_2, and WSe_2" **MRS Spring Meeting**, San Francisco, CA (2015)
8. **Y.-C. Lin**, "Lego on the Nanoscale", Oral Presentation, **the Millennium Café**, Pennsylvania State University, University Park, PA (2015)
9. **Y.-C. Lin**, J. Crespi, N. Perea-Lopez, C.-H. Lee, T. Miyaki, J. A. Robinson "Scalable Heterogeneous Synthesis of TMD Atomic Layers on Epitaxial Graphene" **MRS Fall Meeting**, Boston, MA (2013)

SELECTED MEDIA COVERAGE

1. "*Scalable two-dimensional materials for future gen electronics*", **Phys.org**, Feb. 13, 2018
2. "*Stenciling with Atoms in Two-Dimensional Materials*", **newswise**, April 27, 2017
3. "*SciTech Now-2D Tech*", **WPSU TV**, Jan. 18, 2017 (Link: https://youtu.be/Y3eR32PoeuE)
4. "*Diode a few atoms thick shows surprising quantum effect*", **Phys.org**, June 23, 2015
5. "*Mind the Gap between atomically thin materials*", **Phys.org**, Dec. 24, 2014
6. "*Chemical vapor deposition used to grow atomic layer materials on top of each other*", **Phys.org**, April 16, 2014

LEADERSHIP AND PROFESSIONAL SERVICES

Laboratory Safety Officer

- Promoting and supporting a safety-first culture in our lab and by setting an example of attaching to the school safety protocol, pursuing a clean and organized lab environment, testing safety equipment

Referee Service

Nature, Nature Communications, Scientific Reports, Nano Letters, ACS Nano, Advanced Materials, Carbon, Physical Chemistry Chemical Physics, Journal of Crystal Growth, IOP 2D Materials, APL Materials

TEACHING AND MENTORSHIP

Penn State University

Teaching Assistant Fall, 2015 and 2016

"Metallurgical Laboratory" with the instructor, Dr. Amy C. Robinson

- Led two sessions weekly for a class of twenty undergraduates majored in Materials Sciences
- Prepared lab materials and taught lectures to students prior to the lab

National Taiwan University

Teaching Assistant From Fall 2009 to Spring 2011

Graduate level "Quantum Mechanics", with Professor Jeng-Wei Chen

Undergraduate level "Electromagnetism" with Professor Jeng-Wei Chen

- Engaged students in the office hours; Graded exams and homework

Student Mentees

- Jennifer G. DiStefano (Penn State undergraduate, Schreyer Scholar, January 2013 – May 2016)
- Kursti S. DeLello (Univ. of Central Florida undergraduate, REU Summer Scholar, May 2016 – August 2016)
- Jing-Kai Huang (National Chiao-Tung Univ. graduate student, May 2010 – December 2011)

OUTREACH

The USA Science & Engineering Festival, Washington, DC April 5-8 2018

Volunteer

- Interacted with booth visitors, teaching them about the super nova in the universe and how batteries and mass spectrometry work in real life, and learning about their ideas regarding physical sciences

Science Leadership Camp – Research Snapshot, Penn State University, PA

Volunteer July 22-23 2015

- Organized interactive demonstrations, such as nanomaterials preparation and characterizations to high school visitors

PROFESSIONAL ASSOCIATIONS

American Chemical Society

Materials Research Society

CONTACT INFORMATION FOR REFERENCES

1. **Dr. Joshua A. Robinson** (PhD thesis advisor)
   Associate Professor of Materials Science and Engineering, Pennsylvania State University
   Address: N-337 Millennium Science Complex, University Park, PA 16802
   Email: jrobinson@psu.edu
   Phone: (814) 863-8567
2. **Dr. Joan M. Redwing** (Thesis committee and collaborator)
   Professor of Materials Science and Engineering, Pennsylvania State University
   Address: N-336 Millennium Science Complex, University Park, PA 16802
   Email: jmr31@psu.edu
   Phone: (814) 865-8665
3. **Dr. Mauricio Terrones** (Thesis committee and collaborator)
   Professor of Physics, Chemistry and Materials Science & Engineering
   Address: 205A Osmond, University Park, PA 16802
   Email: mtterrones@gmail.com
   Phone: (014) 865-0343
4. **Dr. Robert M. Wallace** (Research theme manager and collaborator)
   Erik Jonsson Distinguished Chair Professor of Materials Science and Engineering
   at University Texas at Dallas
   Address: RL 10, 800 W. Campbell Rd., Richardson, TX 75080
   Email: rmwallace@utdallas.edu